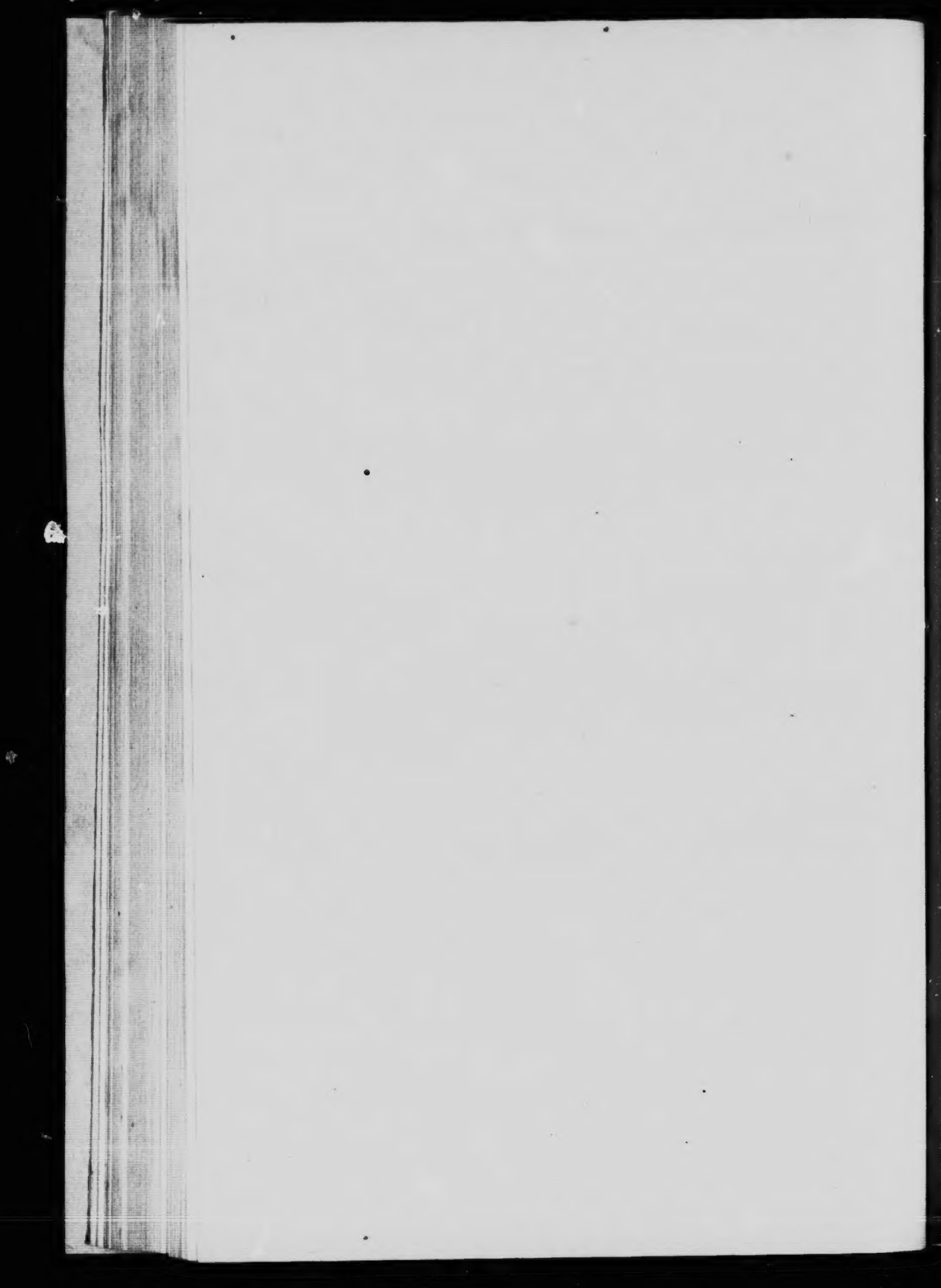




DEPARTMENT OF AGRICULTURE

Dairy and Cold Storage Commissioner's Branch

OTTAWA, CANADA

A REPORT

ON

SOME TRIAL SHIPMENTS

OF

Cold Storage Apples

BY

J. A. RUDDICK

Dairy and Cold Storage Commissioner

BULLETIN No. 24

Dairy and Cold Storage Series

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LETTER OF TRANSMITTAL.

OTTAWA, June 22nd, 1910.

To the Honourable

The Minister of Agriculture.

SIR,—I have the honour to submit a report of the trial cold storage of apples authorized by you last autumn. The information should be of interest to fruit growers and dealers, and I beg to recommend that it be printed for distribution as Bulletin No. 24 of the Dairy and Cold Storage Series.

I have the honour to be, Sir,

Your obedient servant,

J. A. RUDDICK,

Commissioner.

A REPORT

ON

SOME TRIAL SHIPMENTS OF COLD STORAGE APPLES.

By J. A. Ruddick.

INTRODUCTION.

During recent years the amount of frostproof storage space for apples has been largely increased throughout the apple growing sections of Canada. The following statistics relating to such storage have been collected by this office:

Special Frost-Proof Warehouses in 1900.	Number of Warehouses.	Barrels stored.
Ontario.....	56	219,000
Nova Scotia.....	70	386,000
New Brunswick (St. John).....	7	18,000
Quebec (Montreal).....		37,000
	133	660,000

To these figures must be added the very large quantity which is stored in cellars and odd places all over the country.

It is the practice to repack practically the whole of this large quantity of apples, at very considerable expense. This refers principally to the apples stored in the special warehouses. The repacking may be necessary under these conditions of storage, in order that the rotten and defective apples may be discarded, but it results in serious damage to the sound fruit by increasing the number of bruises, to which the apples are more liable than they are at harvest time, on account of their riper and softer condition. These repacked apples are sent forward to market during the winter and early spring months. It is an undeniable fact that a large proportion of them are in a more or less overripened and damaged condition. The shrinkage which occurs in repacking is a direct loss, amounting, on the whole, to a very large sum. The indirect loss from the demoralizing effect of a large quantity of overripe and damaged fruit on the market is also great, and difficult to estimate.

As the crop of apples is increasing from year to year, and the industry is growing in importance by the opening of a large market in the prairie provinces in addition to the well sustained demand in Great Britain and continental countries, it is obvious that any means which may be adopted for better preservation and to reduce the waste and cost of repacking should be a matter of interest to the fruit grower and dealer.

COLD STORAGE FOR APPLES.

Cold storage as a means of preserving the apple crop is attracting more attention every year. In the state of New York a very large percentage of the apples which

are required for winter use are placed in cold storage direct from the orchard. These apples are . . . packed, as a rule. It is estimated that over 6,000,000 barrels are cold stored every year in the United States.

Up to the present time, cold storage has been used but little to preserve the apple crop of Canada. Only about 60,000 barrels of apples were cold stored in different parts of Canada during the season of 1909-10. This failure to employ cold storage is partly due to a lack of cold storage facilities at suitable points, and partly to a lack of information on the part of growers and dealers as to the benefits that may be derived from the use of such facilities.

PLAN OF EXPERIMENTS.

With a view of making a practical test of the advantages of cold storage for late winter and spring shipments, the Minister gave his authority for the purchase of a quantity of apples for that purpose last autumn. The high prices which prevailed at the time these apples were purchased, and the weak market which ruled afterwards, prevented us from showing a profit on all the apples handled; but fruit growers and shippers who study the figures which are submitted herein will be able to draw some conclusions from the net prices which were realized, bearing in mind that, while the balance is on the wrong side of the ledger in most cases, the net losses, where they occur, would have been much greater if the apples had not been cold stored.

The two carloads grown in Elgin County, Ontario, consisting of Spies, Baldwins and Greenings, were stored at London, with the expectation of selling them during the spring in the Ontario markets. It turned out, however, that the markets were overloaded with ordinary storage stock, and for that reason they were shipped to Calgary.

In regard to the lots grown in Ontario County and stored at Oshawa, Montreal and St. John, the original plans for disposal were carried out.

A tendency to early decay was a marked feature of the apple crop of 1909, and this is a point that should not be lost sight of in considering the results of these trials, particularly in regard to the preservation of the apples.

The apples purchased were the ordinary commercial packs of different growers, as represented by The Oshawa Fruit Growers, Limited, and The Sparta Co-operative Fruit Growers' Association.

In presenting the results of these trials we have taken each shipment separately, showing the net returns against the total cost, including freight and storage charges and the expenses of members of the staff in looking after the packing and shipment. These costs are necessarily much higher than they would be in a regular commercial transaction, where careful records and notes are not necessary.

It was thought advisable to have one carload of apples held in an ordinary frost-proof storage for the sake of comparison. These apples were from the same orchards and packed by the same persons as the apples stored at Montreal and St. John.

With the exception of lots 1 and 2, the apples were carried in cold storage across the Atlantic, and the two Calgary lots were shipped in refrigerator cars. All the apples carried in cold storage were held at a temperature of 32 to 34 degrees during the whole storage period.

Lot 1.—Apples in barrels stored at Oshawa, Ont., in frost proof warehouse.

Picked—October 25-30.

Packed—November 22-23.

Stored—November 22-23.

Shipped from Oshawa—February 24.

“ “ St. John—March 2.

COST.

No. Brls.	Variety.	Purchase Price.	Amount.	Cost of Repacking before Shipment.	Total Cost.
		\$	\$	\$	\$
26	No. 1 Spy.....	3.75	97.50	1.79	97.20
20	" 2 ".....	2.75	55.00	1.30	56.30
26	" 1 Baldwin..	3.25	84.50	1.70	86.20
20	" 2 ".....	2.50	50.00	1.30	51.30
92			287.00	6.00	293.00

PROCEEDS.

Sold by Simons, Jacobs & Co., Glasgow, March 15, 1910, ex ss. *Cassandra* from St. John, N.B.

No. Brls.	Variety.	Average Price Sold for.	Gross Proceeds.	Total Charges.	Net Proceeds.	Net loss per Brl.
		\$	\$	\$	\$	\$
24	No. 1 Spy.....	3.67	88.11	34.08	54.03	1.73
19	" 2 ".....	3.40	64.60	26.79	37.81	0.92
24	" 1 Baldwin..	4.39	105.36	35.04	70.32	0.61
20	" 2 ".....	3.77	75.42	28.40	47.02	0.21
87			333.49	124.31	209.18	
5 used	in repacking.					
92						

A thermograph was placed in the warehouse along with the apples and a continuous record of temperature was obtained. For the first 9 days the temperature was between 40 and 42 degrees. During the following month averaged about 35 degrees and from that time until the apples were shipped, it varied only between 32 and 34 degrees. The temperature in the car from Oshawa to St. John held steadily at 32 degrees.

These apples were repacked before shipping, the shrinkage being 5 barrels in 92. They were sold at the same time as lot 3, but under separate marks. Although no charge for storage is included in the total cost of this lot, the net loss was greater than in any other lot of the same apples. This was partly due to the loss and expense in repacking and partly to a poor market, but if these apples had been held longer before sale, the loss would in all probability have been greater.

Our cargo inspector at Glasgow, Mr. Jas. Findlay, reporting on this lot, stated: "This mark, while in very fair order as a whole, were mostly slight 'shakes' and the fruit was rather ripe and inclined to give way." He also mentions that the Baldwins showed considerable scald.

Lot 2.—Apples in barrels stored at St. John, N.B., in cold storage.

Picked (Baldwins)—October 25-30.

" (Spies)—November 1-5

Packed (Spies)—November 2-5.

" (Baldwins)—November 6-9.

Stored at St. John—November 15.

Shipped to Glasgow—March 2.

COST.

No. Brls.	Variety.	Purchase Price.	Amount.	Cost of opening examining and tightening brls. before shipment.	Storage charges.	Total cost.
		\$	\$	\$	\$	\$
45	No. 1 Spy	3.75	168.75	2.92	11.25	182.92
40	" 2 "	2.75	110.00	2.60	10.00	122.60
40	" 1 Baldwin...	3.25	130.00	2.60	10.00	142.60
30	" 2 "	2.50	75.00	1.95	7.50	84.45
155			483.75	10.07	38.75	532.57

PROCEEDS.

Sold by Simons, Jacobs & Co., Glasgow, March 15, 1910, ex ss. *Cassandra* from St. John, N. B.

No. Brls.	Variety.	Average Price Sold for.	Gross Proceeds.	Total Charges.	Net Proceeds.	Net loss per Brl.
		\$	\$	\$	\$	\$
44	No. 1 Spy	4.57	201.08	64.68	136.40	1.03
40	" 2 "	3.60	144.00	56.80	87.20	0.88
40	" 1 Baldwin...	4.66	186.40	58.45	127.95	0.36
30	" 2 "	3.90	117.00	42.90	74.10	0.34
154			648.48	222.83	425.65	
1 used in plugging barrels.						
155						

NOTE.—The freight from Oshawa to Glasgow via St. John, N.B., worked out at \$1.02 per barrel and the broker's charges for insurance, landing, delivering, etc., at 21 cents per barrel. The usual 5 per cent commission was charged.

This lot was from the same orchards as lot 1. It included two marks, "A" and "B." The A's were carefully packed, to avoid, if possible, the necessity of repacking. The packing of the B's was in accordance with the usual practice and was intended to be temporary, with a view to repacking.

The condition of both marks was found to be so good on March 1st that it was decided to ship them as they were, after "plugging" the slack barrels. Only one barrel was used to plug 154. It was thought that the damage from repacking the B's would amount to more than the possible unevenness of the original temporary pack. It will be observed that this lot shows a better return than lot 1, after charging the cold storage expenses.

It should be remembered that lot 1 and lot 2 were packed alike, that lot 1 was repacked before shipment, with a shrinkage of 5 barrels in 92, and that lot 2 (in cold storage) was not repacked, one barrel in 155 being used for plugging.

Lots 1 and 2 were carried as ordinary cargo across the Atlantic at a temperature of about 40 degrees.

Mr. Findlay reported as follows concerning lot 2:—

'The apples in above steamer shipped by the Department of Agriculture, branded 'Oshawa Fruit Growers' Association.' I found on arrival to be in the following condition:—

"Spy No. 1 and 2 grade, countermarked 'A,' were in good, sound condition, almost free from bruise spots. I saw several of the bottoms of barrels of No. 1's and they all were very sound; the colour was good, the size even, and they were generally choice. The Baldwins No. 1 and 2 of this mark were also in good condition, free from scald, and of good colour and even size.

"Spy No. 1 and 2 countermarked 'B' were also in good condition, but fruit not so even, large and smaller apples being mixed. A trace of bruising was just showing on odd apples throughout the barrels, and colouring was not so even or good. Baldwins No. 1 and 2 were in good condition, an odd apple here and there showing 'brown' in the barrels; otherwise, fruit was clean and of very fair colour generally."

SALE OF LOTS 1 AND 2 COMPARED.

Variety and Grade.	Lot 1 Frost Proof Storage.			Lot 2 Cold Storage.			Difference per Brl. in favor of	
	Storage Period.	Temperature.	Net Loss Per Brl.	Storage Period.	Temp.	Net Loss Per Brl.	Cold storage after paying storage charge of 25c per bl.	Frost proof storage
Spy No. 1.....	Nov. 22	About 40 deg.	\$ 1.73	Nov. 18	deg. 32	\$ 1.03	\$.70	\$
" " 2.....	1909	first fortnight ;	.92	1909	"	.83	.04	"
	to	about 34 deg.		to	"	.36	.25	"
Baldwin No 1.....	Feb. 24	2nd fortnight	.61	Mch. 2	"	.34	...	"
" " 2.....	1910.	and about 35 deg. for balance of period.	.21	1910				.13

NOTE.—The apples ex Oshawa frost proof storage were shipped on February 24th and during the six days the car was in transit to St. John the temperature in the car remained steadily at 32 degrees.

Lot 3.—Apples in barrels stored at St. John, N.B., in cold storage.

Picked (Baldwins)—October 25-30.

" (Spies)—November 1-5.

Packed (Spies)—November 2-5.

" (Baldwins)—November 6-9.

Stored at St. John—November 15.

Shipped to Glasgow—April 13.

COST.

No. Brls.	Variety.	Purchase price.	Amount.	Cost of opening examining & tightening brls. before shipment.	Storage charges.	Total cost.
43	o. Spy	\$ 3.75	\$ 161.25	\$ 3.76	\$ 10.75	\$ 175.76
20	" "	2.75	55.00	1.75	5.00	61.75
48	" Baldwin	3.25	156.00	4.20	12.00	172.20
30	" 2 "	2.50	75.00	2.62	7.50	85.12
141			447.25	12.33	35.25	494.83

PROCEEDS.

Sold by Simons, Jacobs & Co., Glasgow, April 26, 1910, ex. ss. *Cassandra* from St. John, N.B.

No. Brls.	Variety.	Average price sold for.	Gross proceeds.	Total charges.	Net proceeds.	Net loss per brl.	Net profit per brl.
		\$	\$	\$	\$	\$	\$
43	No. 1 Spy	5.00	216.90	73.09	143.81	0.74	....
20	" 2 "	4.79	96.88	33.80	63.08	....	0.07
48	" 1 Baldwin...	4.75	230.65	81.01	149.64	0.47	....
30	" 2 " ...	4.35	131.74	50.03	81.71	0.11	....
141			676.17	237.93	438.24		

NOTE.—These apples were shipped in cold storage and the through freight from Oshawa to Glasgow averaged \$1.27 per barrel. Broker's charges for landing, delivering, etc., were 18 cents per barrel. Commission 5 per cent.

This lot was the same as lot 2, but was shipped six weeks later. There was no re-packing, although it was originally intended to repack the barrels countermarked "B." The shipment was carried from St. John to Glasgow in cold storage at a temperature of 34 degrees.

Simons, Jacobs & Co., the consignees, reported that "the Spies were decidedly spent, those marked 'B' much more so than those marked 'A.' The Baldwins were decidedly very scalded." The net returns, however, were better than they were for lots 1 and 2, because of the improved market, owing to the fact that ordinary storage apples were practically done.

Lot 4.—Apples in barrels purchased at Oshawa, Ont., and stored at Montreal in cold storage.

Picked—October 25-30.

Packed—October 28-November 16.

Stored at Montreal (1st car)—November 5.

Stored at Montreal (2nd car)—November 20.

Shipped to Glasgow—May 6.

COST.

No. Brls.	Variety.	Purchase price.	Amount.	Freight to Montreal.	General expenses.	Storage charges.	Total cost.
		\$	\$	\$	\$	\$	\$
90	No. 1 Spy	3.75	337.50	29.34	13.65	50.18	430.67
60	" 2 "	2.75	165.00	19.59	9.05	33.45	227.09
88	" 1 Baldwin...	3.25	286.00	28.70	13.35	49.06	377.11
60	" 2 "	2.50	150.00	19.59	9.05	33.45	212.09
298			938.50	97.22	45.10	168.14	1,246.96

PROCEEDS

Sold by Simons, Jacobs & Co., Glasgow, May 17 and 18, 1910, ex. ss. *Ionian* from Montreal.

No. Brls.	Variety.	Average price sold for.	Gross proceeds.	Total Charges.	Net proceeds.	Net loss per brl.
89	No 1 Spy.....	\$ 6.06	\$ 528.79	\$ 135.24	\$ 403.73	\$ 0.29
58	" 2 ".....	4.54	263.25	83.72	179.53	.79
88	" 1 Baldwin.....	5.26	463.06	130.23	332.83	.50
60	" 2 ".....	4.43	265.72	86.29	179.43	.54
295			1,531.00	435.48	1,095.52	
3	Used in plugging barrels before shipment.					
298						

NOTE.—These apples were carried in cold storage in the steamer and the freight rate from Montreal to Glasgow was \$1.03 per barrel; broker's charges 18 cents per barrel and commission 5 per cent.

This lot was stored at Montreal to test the possibility of holding apples at that point for shipment by the St. Lawrence route in the spring. Like Lot 3, it consisted of two marks, "A" and "B." The A's were carefully packed and the B's were intended for repacking. Both marks were shipped without repacking, pads being placed in the tail of each barrel. Three barrels were used for plugging the other 295.

The Spies were reported to be past their best and the Baldwins to be "scalded" at the time they were sold in Glasgow. These apples were packed by several growers in the vicinity of Oshawa and showed considerable variation in quality and packing. Each variety and grade was kept separate for the purpose of sale, and the prices obtained at auction ranged from 15 shillings a barrel up to 28 shillings for the Spies, and from 15 to 23 shillings for Baldwins. The lower prices were for a few barrels catalogued as "slack." Some of the fruit was of very ordinary quality and showed the effects of rough handling in many skin punctures.

Attention is drawn to the delay which occurred between picking and storing. The continued ripening which was thus permitted was undoubtedly the chief reason why these apples were out of condition when they were shipped.

LOT 5.—Apples in boxes purchased at Oshawa, Ont., and stored at St. John, N.B., in cold storage.

Picked (Baldwins)—October 25–30.

" (Spies)—November 1–5.

Packed (Spies)—November 2–5.

" (Baldwins)—November 6–9.

Stored at St. John, November 15.

Shipped to Glasgow—April 18

COST.

No. Boxes.	Variety.	Purchase Price.	Amount.	Storage Charges.	Total Cost.
110	No. 1 Spy.....	\$ 1.35	\$ 148.50	\$ 11.00	\$ 159.50
113	" 1 Baldwin..	1.25	141.25	11.30	152.55
223			289.75	22.30	312.05

PROCEEDS.

Sold by R. & W. Davidson, Glasgow, April 26, 1910, ex. ss. *Cassandra* from St. John, N.B.

No. Boxes.	Variety.	Average Price Sold For.	Gross Proceeds.	Total Charges.	Net Proceeds.	Net Loss per Box.	Net profit per Box.
106	No. 1 Spy ..	2.16	238.04	65.95	167.09	.....	0.07
113	" 1 Baldwin	1.84	208.35	66.20	142.15	0.09	.....
221			441.39	132.15	309.24		
223	2 boxes Spy used by consignee to fill up slack boxes.						

NOTE.—The inland freight rate from Oshawa to St. John averaged 10 cents per box; the ocean freight rate (including cold storage) 26½ cents per box; dues and landing charges 3½ cents per box; store rent and insurance (fire) 8 cents per box and 5 per cent commission.

Lot 5 was from the same district and from practically the same orchards as the previous lots.

Owing to a lack of experienced box packers at the time these apples were put up, the packing was in some cases only fair.

The Spies were reported as being rather overripe on arrival at Glasgow and some of the boxes required filling up. The Spies sold at 7 shillings and 6 pence to 10 shillings per box. It will be observed that these apples gave us a profit after paying all charges on the first cost of \$1.35 per box.

The Baldwins kept very much better than the Spies, every box being sold as originally packed. The price, however, was lower than for the Spies and varied from 6 shillings to 8 shillings per box.

Lot 6.—Apples in boxes purchased at Oshawa, Ont., and stored at Montreal, in cold storage.

Picked (Baldwins)—October 25–30.

" (Spies)—October 28–29.

Packed (Spies)—October 28–29.

" (Baldwins)—November 10–16.

Stored at Montreal (Spies)—November 5.

" " (Baldwins)—November 20.

Shipped to Glasgow—May 6.

COST.

No. Boxes.	Variety.	Purchase Price.	Amount.	Freight to Montreal.	General Expenses.	Storage Charges.	Total Cost.
115	No. 1 Spy.....	1.35	155.25	12.65	5.75	21.27	194.92
113	" 1 Baldwin..	1.25	141.25	12.43	5.65	20.90	180.23
228			296.50	25.08	11.40	42.17	375.15

PROCEEDS.

Sold by R. & W. Davidson, Glasgow, May 17 and 18, 1910, ex. ss. *Ionian* from Montreal.

No. Boxes.	Variety.	Average Price Sold for.	Gross Proceeds.	Total Charges.	Net Proceeds.	Net Loss per Box.
*117	No. 1 Spy.....	\$ 1.79	\$ 209.02	\$ 55.82	\$ 153.20	0 36
*108	" 1 Baldwin...	1.76	190.41	51 40	139.01	0 36
225			399.43	107.22	292.21	
3 used	by consignee to fill slack boxes.					
228						

* The account sales show five boxes Spy more and five boxes Baldwins less than were shipped.

NOTE.—The ocean freight from Montreal to Glasgow in cold storage averaged 27 cents per box; broker's charges for dues and landing, etc., $3\frac{1}{4}$ cents per box, store rent and insurance 8 cents per box and commission 5 per cent.

The only difference in the handling of Lots 5 and 6 was that Lot 5 was stored at St. John, N.B., while Lot 6 was stored at Montreal and was shipped three weeks later by the first sailing for Glasgow via the St. Lawrence.

The Spies in Lot 6 were reported as being overripe and a number of the boxes were wasty. Three boxes of Spies were used to fill up the others.

It is evident that these apples were kept past the period of their best condition, and it is quite probable that better prices would have been realized if they had been sold a month earlier. The best of the Spies sold from 8 shillings to 9 shillings and 6 pence per box, but a number of wasty boxes sold at 3 shillings and 4 pence to 5 shillings and 10 pence, which reduced the average price for the lot.

The Baldwins kept well and were sold as originally packed at 7 to 8 shillings per box.

LOTS 7 AND 8.—Apples in barrels and boxes grown near Sparta, Elgin County, Ont., and stored at London, Ont., in cold storage.

Variety.	Picked.	Packed.	Stored.
Greenings (Boxes)	October 2-6	October 4-6	October 8
Baldwins (Boxes)	" 25-28	" 25-23	November 1
" (Barrels)	" 27-28	" 27-28	" 10
Spies (Boxes)	" 25-28	" 25-23	" 1
" (Barrels)	" 27-28	" 27-23	" 10

One small lot of Spies and Baldwins in boxes was not stored until November 10.

Lot 7.

COST.

No. Pkgs.		Variety.	Purchase Price.	Amount	Freight to London.	Date Stored.	Storage Charges to April 14, 1910.	General Exps.	Total Cost.
Brls.	Boxes.								
			\$	\$	\$	1909.	\$	\$	\$
	199	No. 1 Greening..	1.30	258.70	10.94	Oct. 8	55.72	15.92	341.28
	10	" 1 Spy.....	1.30	13.00	.55	Nov. 1	2.00	.80	16.35
	10	" 1 Baldwin..	1.30	13.00	.55	" 10	2.00	.80	16.35
16		" 1 Spy....	3.00	48.00	2.40	" 10	9.60	3.84	63.84
16		" 2 ".....	3.00	48.00	2.40	" 10	9.60	3.84	63.84
37		" 2 Baldwin..	3.00	111.00	5.55	" 10	22.20	8.88	147.63
69	219			491.70	22.39	" 10		34.08	649.29

PROCEEDS.

Sold to the Calgary Milling Company, Calgary, Alta. Shipped in an iced car from London, April 14, 1910, via C. P. R.

No. Pkgs.		Variety.	Price F. O. B. Calgary.	Gross Proceeds.	Freight, Icing, Cartage.	Net Proceeds.	Net Loss per Pkg.	Net Profit per Pkg.
Brls.	Boxes.							
			\$	\$	\$	\$	\$	\$
	199	No. 1 Greening..	1.75	348.25	132.33	215.92	0.63	.....
	10	" 1 Spy.....	2.00	20.00	6.65	13.35	.30	.....
	10	" 1 Baldwin..	2.00	20.00	6.65	13.35	.30	.....
16		" 1 Spy.....	6.80	96.00	32.00	64.00	.....	0.01
16		" 2 ".....	5.75	92.00	32.00	60.00	.24	.....
37		" 2 Baldwin..	5.75	212.75	73.97	138.78	.24	.....
69	219			789.00	283.50	505.40		

NOTE.—The freight and icing charges from London to Calgary, all rail, averaged 64 cents per box and \$1.94 per barrel; cartage, Calgary, 2 cents per box and 6 cents per barrel.

Lot 8.

COST.

No. Pkgs.		Variety.	Purchase Price.	Amount.	Freight to London.	Date Stored.	Storage Charges to May 12, 1910.	Gen'l Exps.	Total Cost.
Brls.	Boxes.								
			\$	\$	\$	1909	\$	\$	\$
	4	No. 1 Greening....	1.30	5.20	22	Oct. 8....	1.28	32	7.02
	151	" 1 Spy.....	1.30	196.30	8.30	Nov. 1-10.	36.24	12.08	252.92
	189	" 1 Baldwin.....	1.30	245.70	10.39	" " "	45.36	15.12	316.57
38		" 1 ".....	3.00	114.00	5.70	" 10...	26.60	9.12	155.42
38	344			561.20	24.61		109.48	36.64	731.93

PROCEEDS.

Sold to the Calgary Milling Company, Calgary, Alta. Shipped in an iced car from London, May 12, 1910.

No. Pkgs.	Variety.	Price F. O. B. Calgary.	Gross Proceeds.	Freight, Icing & Cartage.	Net Proceeds.	Net Loss per Pkg.	Net Profit per Pkg.
Br's Boxes							
		\$	\$	\$	\$	\$	\$
4	No. 1 Greening ..	1.75	7.00	2.55	4.45	0.64	0.04
151	" 1 Spy	2.35	354.85	96.33	258.52		
189	" 1 Baldwin	2.25	425.25	120.66	304.59	06	
38	" 1 "	5.75	218.50	72.66	145.84	25	
38 344			1005 00	292.20	713.40		

NOTE.—The freight and icing charges, all rail, averaged 62 cents per box and \$1.85 per barrel; cartage, Calgary, 3 cents per box and 6 cents per barrel.

The only difference between Lots 7 and 8 is that Lot 8 was shipped and sold just four weeks later than Lot 7.

It will be observed that these apples were stored on different dates from October 1st to November 10th. The boxed apples, with the exception already noted, were in cold storage within two to six days from the time they were picked, but there was a delay of nearly two weeks in the storing of the barrels. This difference is important and will be referred to again.

The Spies and Baldwins were well ripened, well matured and well coloured, as would be expected from the dates on which they were picked. They were left on the trees rather later than usual. The Greenings were rather small, but well matured.

The packing was well done and every box or barrel was sold as originally packed, without any plugging or padding. Of course, it must be remembered that these apples were packed with some care, so as to avoid the necessity of repacking. In that sense they differed from those packed at Oshawa, part of which it was intended to repack.

Lot No. 7 was shipped to Calgary in a refrigerator car consigned to Mr. M. P. McNeill, Dominion fruit inspector, who received instructions to dispose of the apples to best advantage. We found that we were not able to get a fair bid for the apples at that date until prospective purchasers had had an opportunity of examining them. The car was sold to The Calgary Milling Company at the following prices, delivered at Calgary:

Greenings.....	\$1 75 per box.
Spies.....	2 00 " "
Baldwins.....	2 00 " "
Spies, No. 1.....	6 00 per barrel.
" " 2.....	5 75 " "
Baldwins, No. 2.....	5 75 " "

Inspector McNeill reported as follows:—

"The apples were in fine condition, especially the boxes, and No. 1 Spies in barrels. I was surprised at the Greenings being so good."

The following paragraph in reference to these apples is taken from *The Calgary Albertan* of May 3rd.

"The first experiment in shipping Ontario apples in cold storage to western Canada was made last week and was so successful that it will be continued. A car load of apples were despatched from cold storage in London, by J. A. Ruddick, Cold Storage Commissioner, to M. P. McNeill, of Calgary, fruit inspector of this city. The apples

were in cold storage until they reached Calgary, and arrived in practically perfect condition. The car load was quickly sold to a local grocery, and are being retailed rapidly throughout the city.

"The apples are high grade and are quite as good as though just picked from the trees. The experiment was so satisfactory that succeeding cars will be brought in."

Inspector McNeill wrote on June 18th as follows:—

"The Calgary Milling Company sold 100 boxes of the Greenings from the first car (which arrived April 23rd) to the Canadian Pacific Railway Dining Car Department and they (The Calgary Milling Company) still have 25 of these boxes in their cellar. It was hard for me to believe until I saw them, that they would be in good condition. They are quite sound yet, although somewhat rusty (scalded), but only skin deep."

Lot 8 left London in an iced car on May 12th and reached Calgary in about ten days' time. They had been sold to The Calgary Milling Company, on the strength of the previous shipment, at the following prices:

Greenings, No. 1.	1..	\$1 75	per box.
Spies " 1.	1..	2 35	" "
Baldwins " 1.	1..	2 25	" "
" " 1.	1..	5 75	per barrel.

On May 30 The Calgary Milling Company wrote as follows:—

"The apples reached us in good condition and gave good satisfaction, with the exception of the barrels. We do not think it would be advisable to hold barrels for shipment in the spring."

The sale of this lot closed out the last of the apples which were purchased in the fall of 1909.

The transaction in both lots shows a loss except with the Spies in barrels in Lot 7 and the boxed Spies in Lot 8, but there were several things in connection with the total cost of these apples which should not be overlooked.

The storage charge at London was very high, averaging for Lot 7 28 cents per box for Greenings,* 20 cents per box for Spies and Baldwins, and 60 cents per barrel for Baldwins.

Allowing a more reasonable charge of, say, 18 cents per box and 50 cents per barrel, and eliminating the "general expenses" (travelling expenses of officers of the department), the net loss on the boxed apples would be reduced to the following figures: Greenings, 45c. per box; Spies and Baldwins, 20c. per box. On the barrelled stock there would be the following profit: No. 1 Spy, 35c. per barrel; No. 2 Spy, 10c. per barrel; No. 2 Baldwin, 10c. per barrel.

Making the same allowance on Lot 8, the statement would read as follows:—

Loss on Greenings, 42c. per box; profit on Spies, 17c. per box; profit on Baldwins, 8c. per box and 19c. per barrel.

* The Greenings were stored earlier than the Spies and Baldwins.

SUMMARY.

NET PRICES REALIZED.

Assuming that the Oshawa apples had been handled by the original owners, thus saving the charge for the expenses of members of the staff in attending to the purchase, pecking and shipment of the different lots, the net prices, f.o.b. Oshawa would have been as follows:—

Variety and Grade.	Lot 1.	Lot 2.	Lot 3.	Lot 4.	Lot 5.	Lot 6.
	Sold Glasgow March 15.	Sold Glasgow March 15.	Sold Glasgow April 20.	Sold Glasgow May 17-18.	Sold Glasgow April 26.	Sold Glasgow May 17-18.
	Net Price Realized at Oshawa.	Net Price Realized at Oshawa.	Net Price Realized at Oshawa.	Net Price Realized at Oshawa.	Net Price Realized at Oshawa.	Net Price Realized at Oshawa.
	Per Brl.	Per Brl.	Per Brl.	Per Brl.	Per Box.	Per Box.
Spy No. 1	\$ 2.02	\$ 2.72	\$ 3.01	\$ 3.46	\$ 1.42	\$ 0.90
" " 2	1.83	1.87	2.82	1.96		
Baldwin No. 1	2.64	2.80	2.78	2.75	1.16	0.89
" " 2	2.29	2.16	2.39	1.96		

NOTE.—Lot 1 was stored at Oshawa in frost proof storage and no charge has been made for storage; lots 2 and 3 were stored at St. John in cold storage at a cost of 25 cents per barrel, lot 4 was stored at Montreal in cold storage at a cost of 56 cents per barrel; lot 5 (boxes) was stored at St. John in cold storage at a cost of 10 cents per box, and lot 6 at Montreal in cold storage at a cost of 19 cents per box.

The cold storage rates at London, Ont., were rather excessive. A season rate of 50 cents per barrel or 18 cents per box is about the usual charge. If the charge for storage is reduced to the above figures and if the local freight to London and the expenses of members of the staff are eliminated, the net prices realized for the Sparta apples would be as follows:—

Variety and Grade.	Lot 7.		Lot 8.	
	Shipped from London April 14th. 1910.		Shipped from London May 12th. 1910.	
	Net Price at Sparta.		Net Price at Sparta.	
	Per Brl.	Per Box.	Per Brl.	Per Box.
Greening No. 1	\$	\$	\$	\$
Spy No. 1	3.50	1.16		1.53
" " 2	3.25			
Baldwin No. 1		1.16	3.54	1.43
" " 2	3.25			

This puts the deal on a level with what it would have been if the apples had been handled by the original owners in a cold storage warehouse at Sparta, at the usual storage rates.

FROSTPROOF VS. COLD STORAGE.

The only actual comparison of the two kinds of storage in these trials is between Lots 1 and 2. All the apples were from the same orchards and packed by the same people and were sold at the same time.

For the first six weeks the temperature in the frostproof warehouse was from three to ten degrees too high, but after that it was equivalent to cold storage. (See page 7). The difference in the storage temperature as between Lot 1 and Lot 2 was not very great, and yet it was sufficient to cause a noticeable difference in the keeping of the apples, in favour of Lot 2 (cold storage). The difference would have been more marked if Lot 2 had been placed in cold storage promptly after picking. Every result in these experiments points to the importance of immediate storing after picking.

EARLY VS. LATE PICKING.

Special tests were made with Spies and Greenings to determine the effect of early and late picking. There was a difference of two weeks between the two pickings. Needless to say, the later picked apples had the better colour and appearance.

A careful test of the keeping quality of these apples, picked from the same trees at different dates, was made by removing sample boxes from the cold storage on April 4th and keeping them at ordinary room temperatures at this office. They were examined from time to time and it was found that the late picked Spies showed rather the better keeping quality, although the difference was not very marked.

The early picked Greenings were badly scalded when removed from cold storage, while the later picked ones were almost free from that defect. The later picked Greenings kept rather better than the early picked ones.

DELAYED VS. PROMPT COLD STORING OF APPLES.

The advantage gained by the prompt cold storing of apples after picking is one of the most striking lessons to be drawn from the results of these trials.

There was a delay of two to three weeks between picking and storing of the apples purchased at Oshawa and stored at Montreal and St. John. The boxed apples purchased at Sparta and stored at London were in cold storage within two to six days after they were picked, but there was a delay of twelve days in the storing of the barreled apples at London. All the apples stored at London kept very much better than those stored at Montreal or St. John, although the conditions of storage were equally good at all three places. Accurate records of temperature were obtained with locked thermographs throughout the whole storage period at each warehouse.

Lot 8 of the apples stored at London were the last ones disposed of, and yet they were firmer and in better condition in every way than any of the other lots were at the time of sale, except Lot 7.

The London apples showed evidence of greater care in picking and packing, which was a strong point in their favour; but, apart from that, they were much better preserved than the apples stored at Montreal and St. John.

This point cannot be too strongly emphasized. It points to the advisability of having the cold storage facilities for apples located as near as possible to the point of production.

COLD STORAGE AND REPACKING.

Although the season was a rather unfavourable one, on account of the early deterioration of the Spies, our experience in these trials points to the possibility and the practicability of shipping carefully packed winter apples, that have been promptly cold-stored, without repacking. It would be an immense advantage to the apple trade if repacking could be dispensed with.

EXTENDING THE SEASON FOR GREENINGS.

It is quite evident that the usual season for Greenings may be extended several weeks if the apples are well matured on the trees and placed in cold storage without

delay after picking. The Greenings stored at London were sold in Calgary during the last week in April and gave good satisfaction. A number of boxes stored in a cellar were reported to be sound and in good condition, except scald, on June 18th. However, we do not advise that Greenings should be kept as late as the dates mentioned. It would be well to go slowly in the matter of holding any variety much past its recognized season. The thing which demands first attention is an improvement in the condition of the apples as now shipped.

THE KEEPING QUALITY OF APPLES COMING OUT OF COLD STORAGE.

It is very frequently asserted that apples deteriorate quickly after being removed from cold storage. It would seem to depend entirely on the stage which the ripening process had reached. Apples ripen slowly in cold storage. If they are held until the limit is nearly reached, they naturally deteriorate quickly when removed, but no more quickly than they would if the same stage had been reached in ordinary storage at any temperature.

The case of the Greenings, already mentioned, is fairly conclusive proof that apples do not necessarily "go down" quickly after cold storage, if the conditions have been right.

There is evidence in the results of these trials which would go to show that apples which are cold stored promptly after picking and held at 32-34 degrees for say five months, then removed to a high temperature for one month, will be in better condition at the end of the sixth month than if they had been exposed to the same high temperature for the first month and then placed in cold storage for the rest of the period. Or, in other words, exposure to a high temperature just after picking, when the life processes are active in the apple, will cause more injury than the same exposure at a later stage.

ACKNOWLEDGMENTS.

We are indebted to the managers of The London Cold Storage Company, Gould's Cold Storage, Montreal, and The New Brunswick Cold Storage Company at St. John for the careful and satisfactory manner in which these apples were handled.

We desire to acknowledge our obligations to Mr. J. A. Webster, of The Sparta Fruit Growers' Association, and Mr. Elmer Lick, of The Oshawa Fruit Growers' Limited, for assistance in securing the apples for the experiments.

The author wishes to place on record an appreciation of the careful work done by his assistant, Mr. W. W. Moore, who attended to the purchase of the apples and prepared the tables in this bulletin, and by Mr. P. J. Carey, Dominion fruit inspector, who supervised the packing of the apples bought at Sparta.

LIST OF PUBLICATIONS

OF THE

DAIRY AND COLD STORAGE COMMISSIONER'S SERIES.

Date Issued.	No.	Title.
1905	1	List of Some British Importers of Farm Products.
1905	*2	Care of Milk for Cheese Factories. } Superseded by Bulletin
1905	*3	Care of Milk for Creameries. } No. 22.
1905	*4	Some Phases of Dairying in Denmark.
1905	5	Improvement of Dairy Herds.
1905	6	Chemical Investigations Relating to Dairying in 1904.
1905	7	List of Exporters of Some Canadian Products.
1906	8	Some of the Factors that Control the Water Content of Butter.
1906	*9	Instructions for Testing Individual Cows, etc.
1906	10	Creamery Cold Storage.
1906	11	The Inspection and Sale Act, Part IX, as amended in 1907-8. (The Fruit Marks Act and Fruit Packages.) Revised Edition.
1906	12	Cow Testing Associations, with Some Notes on the Sampling and Testing of Milk.
1907	13	Sweet-Cream Butter.
1907	14	Apparatus for the Determination of Fat and Water in Butter.
1907	†15	Gathered Cream for Buttermaking.
1907	*16	Subsidies for Cold Storage Warehouses. (Superseded by Bulletin No. 23.)
1907	17	Buttermaking on the Farm.
1907	*18	Co-operation in the Marketing of Apples.
1907	19	The Packing of Apples in Barrels and Boxes.
1907	†20	The Use of Ice on the Farm.
1907	*21	Report of the Cow Testing Associations.
1909	†22	The Cooling of Milk for Cheesemaking.
1909	23	Cold Storage and the Cold Storage Act.
1906		Report of the Dairy Commissioner, January, 1905, to March, 1906.
1907		Report of the Dairy and Cold Storage Commissioner, 1907.
1908		Report of the Dairy and Cold Storage Commissioner, 1908.
1909		Report of the Dairy and Cold Storage Commissioner, 1909.
1907		Map Showing the Location of Cheese Factories and Creameries in Canada.

Any of these publications will be sent free of charge on application to the Dairy and Cold Storage Commissioner, Ottawa, Ont.

*Out of print.

†A sufficient number of bulletins 15, 20 and 22 will be sent to the manager of any cheese factory or creamery to supply one to each patron.



